

Hypothesis Testing Part II

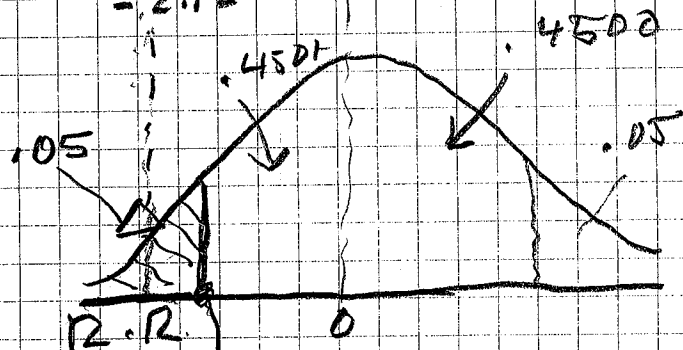
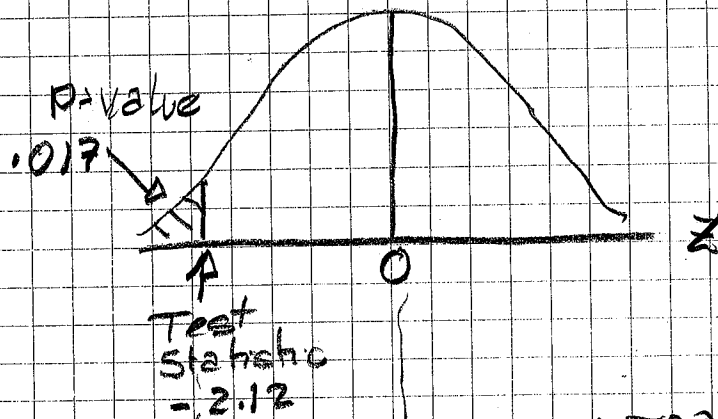
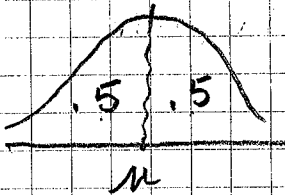
Rejection Regions

$$H_0: \mu = 12$$

$$H_a: \mu < 12$$

If $p\text{-value} < \alpha$,
Reject H_0 and
conclude H_a

$$\alpha = .05$$



$$R.R.: z < -1.645$$

$$\text{Critical Value } z_{\alpha} = -1.645$$

Decision Rule: If the test statistic falls in the R.R., reject H_0 and conclude H_a

P-VALUES

Step 1 Setup H_0 & H_a

Step 2 Test stat

Step 3 P-value

Step 4 If $p\text{-value} < \alpha$
REJECT H_0

Step 5 Conclusion

R.R.

Same

Same

R.R.

If test stat falls in R.R., reject H_0

Same

LEFT-TAIL, RIGHT-TAIL, TWO-TAIL

$H_0: \mu = \mu_0$

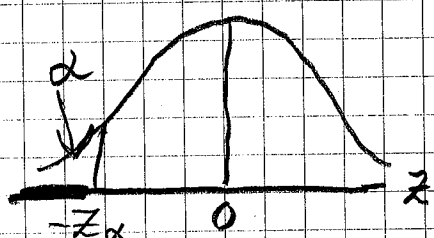
$H_a: \mu < \mu_0$

$H_0: \mu = \mu_0$

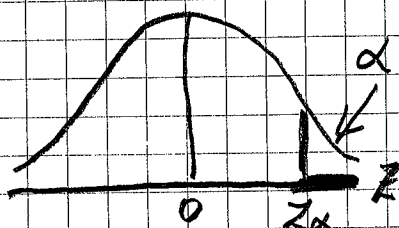
$H_a: \mu > \mu_0$

$H_0: \mu = \mu_0$

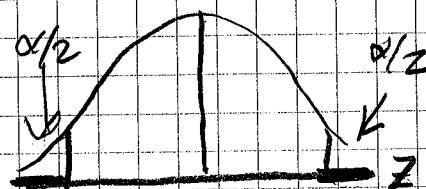
$H_a: \mu \neq \mu_0$



RR: $Z < -z_\alpha$



RR: $Z > z_\alpha$



RR: $Z < -z_{\alpha/2}$

OR
 $Z > z_{\alpha/2}$

$H_0: \mu = 12$

$H_a: \mu \neq 12$

$n = 50$

$\bar{x} = 11.7$

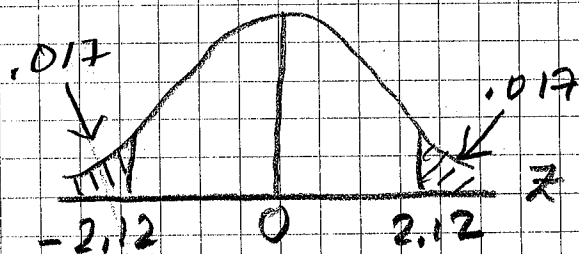
$\sigma = 1$

test statistic

$$Z = \frac{\bar{x} - \mu_0}{\sigma / \sqrt{n}}$$

$$= \frac{11.7 - 12}{1 / \sqrt{50}} = -2.12$$

using p-values

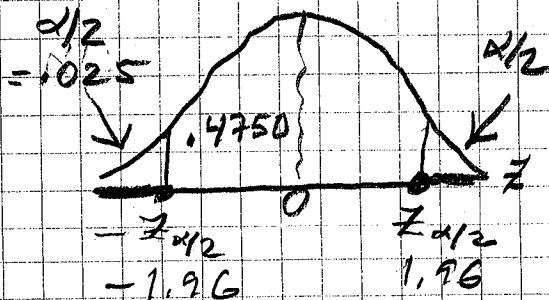


p-value = .034

If p-value $< \alpha = .05$

Reject H_0

Using Rejection Regions



RR: $Z < -1.96$ or $Z > 1.96$

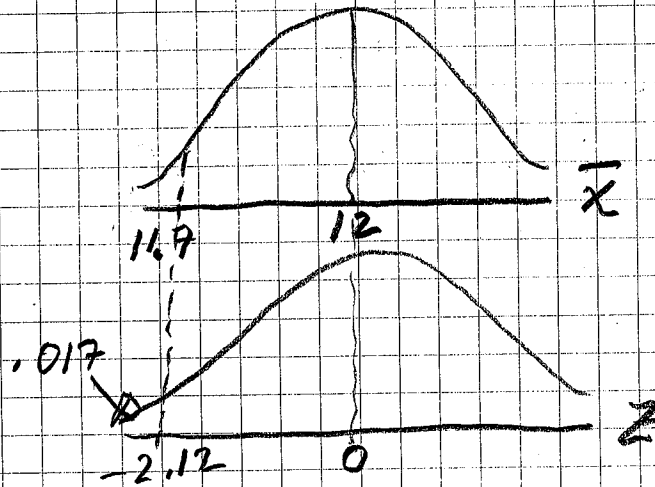
Type I and Type II Errors

$$H_0: \mu = 12$$

$$H_a: \mu < 12$$

$$z = -2.12$$

$$n = 50 \quad \bar{x} = 11.7 \quad s = 1$$



Decisions

Reject H_0

Fail to
Reject H_0

	H_0 T	H_0 F
Reject H_0	TYPE I Error $P = \alpha$	Correct Decision
Fail to Reject H_0	Correct Decision	TYPE II Error $P = \beta$

What is a Type I error? It is rejecting H_0 when H_0 was really true

What is a Type II error in this particular problem? Concluding that the mean content of Supercola cans is less than 12 when it really isn't true

What is a Type II error?

Failing to reject H_0 when it was really false

What is a type II error in this problem?

Concluding that the mean content of Supercola cans is 12 oz when it really isn't true